

Potomac River

SAV Distribution

The well-defined linkage between water quality and submerged aquatic vegetation (SAV) distribution and abundance make SAV communities good barometers of the health of estuarine ecosystems (Dennison *et al.*, 1993). SAV is important not only as an indicator of water quality, but it is also a critical nursery habitat for many estuarine species. Blue crab post-larvae are 30 times more abundant in SAV beds than adjacent unvegetated areas (Orth, 1992). Similarly, several species of waterfowl are dependant on SAV as food when they over-winter in the Chesapeake region (Perry and Deller, 1995).

SAV distribution is determined through the compilation of aerial photography directed by the Virginia Institute of Marine Science. Reports detailing methodology and annual SAV coverage are available at www.vims.edu/bio/sav. Details on species of SAV discussed in this report can be found at www.dnr.maryland.gov/bay/sav/key.

Habitat Status

The Chesapeake Bay Program has developed new criteria for determining SAV habitat suitability of an area based on water quality. The “Percent Light at Leaf” habitat requirement assesses the amount of available light reaching the leaf surface of SAV after being attenuated in the water column and by epiphytic growth on the leaves themselves (Kemp *et al.*, 2004). The document describing this new model is found on the Chesapeake Bay Program website (www.chesapeakebay.net/pubs/sav/index.html). The older “Habitat Requirements” of five water quality parameters are still used for diagnostic purposes (Dennison *et al.*, 1993).

Tidal Fresh Potomac River

The tidal fresh Potomac River has had highly variable SAV coverage, according to the Virginia Institute of Marine Science annual aerial survey (www.vims.edu/bio/sav/), peaking in 1991 at 4,632 acres, or 106% of the 4,368 acre revised goal (**figure 1**). From this high, SAV abundance decreased to a low of 884 acres in 2003, rebounding to 1,256 acres in 2004. The SAV beds fringe many of the shorelines. Ground-truthing by citizens, U. S. Geological Survey, U. S. Fish and Wildlife Service and Virginia Institute of Marine Science has found 11 species of SAV in this region, with wild celery, hydrilla and milfoil being the most reported ones. Data obtained from water quality monitoring stations located near Sheridan Point indicate that suspended solid levels, algae and phosphorous levels are borderline and light attenuation and percent light at leaf fail the SAV habitat requirements (**figure 2**). Nitrogen concentration is not applicable in tidal fresh regions.

Piscataway Creek

Piscataway Creek has had increases in SAV coverage since 1995, though 1999 showed a large decrease from the 1998 levels and 2003 was down significantly from 2002 (www.vims.edu/bio/sav/). The revised goal for this segment is 783 acres and the 2002 SAV coverage represents 81% of this number, respectively (**figure 1**), with the 2002 coverage (632 acres) being the most ever reported by the VIMS survey. 2004 had SAV coverage of 506 acres. In 2001, no data were obtained, again due to flight restrictions resulting from the terrorist attacks of 2001. Most of the SAV beds fringe the southern shore and the headwaters of this creek. Ground-truthing by citizens and staff from the U. S. Geological Survey has found 7 species in Piscataway Creek, listed in order of frequency recorded; hydrilla, naiads (2 species), coontail, wild celery, water stargrass, and milfoil. Water quality data from the station located near Calvert Manor indicate that algae levels pass in respect to the SAV habitat requirements (**figure 2**), while suspended solids concentration is borderline. Light attenuation, phosphorous and percent light at leaf fail these requirements. Nitrogen concentration is not applicable in tidal fresh regions.

Mattawoman Creek

Mattawoman Creek has had steady increases in SAV coverage since 1995 (**figure 1**), surpassing the revised goal (276 acres) in 2000 (331 acres), 2002 (792 acres or 287% of the goal), 2003 (612 acres), and 2004 (601) (www.vims.edu/bio/sav/). No data were obtained for 2001, again due to flight restrictions. Most of the previously identified beds fringe the shoreline, upstream of Swedes and Deep Points. Extensive ground-truthing by staff from the U. S. Geological Survey, U. S. Fish and Wildlife Service and citizens from Friends of Mattawoman Creek has found hydrilla, naiads, wild celery, coontail and milfoil (in order of frequency reported) in this creek. Water quality monitoring data from the station located near Swedes Point indicate that algae and suspended solids levels meet and phosphorous levels pass the SAV habitat requirements (**figure 2**). Light attenuation and percent light at leaf fail the requirements. Nitrogen concentration is not applicable in this tidal fresh creek.

Middle Potomac River

In the oligohaline (low salinity) Potomac River, between Quantico and Mathias Points, SAV coverage has been fairly consistent from 1984 to 2001, ranging from a low of 2,529 acres in 1995 to a high of 4,306 acres in 1998 (**figure 1**), at which time the coverage exceeded the revised goal of 3,721 acres (www.vims.edu/bio/sav/). The 2001 coverage was 3,071 though again these are partial data. In 2002, SAV coverage declined to 1,100 acres and has been slowly rebounding in since (1,384 and 1,408 acres in 2003 and 2004 respectively). The largest SAV beds in the Maryland portion of the river are found in Chicamuxen Creek and then fringing the shoreline to Smith Point, then fringing the shoreline from Maryland Point to just upstream of Pope Creek, including the shorelines of Nanjemoy Creek and Port Tobacco River. On the Virginia side, there are fringing beds from Shipping to Clifton Points, near the mouth of Potomac Creek, near Somerset Beach, the mouth of Chotank Creek, and fringing the shoreline around Mathias Point. Ground-truthing by citizens and staff from U. S. Geological

Survey, U. S. Fish and Wildlife Service and Virginia Institute of Marine Science has found 13 different species of SAV, with the three most often reported being milfoil, wild celery, and hydrilla. Water quality data from the monitoring stations near Moss and Maryland Points indicate that only algae levels meet the SAV habitat requirements, percent light at leaf, concentration of suspended solids, light attenuation and phosphorus levels fail (**figure 2**). Nitrogen concentration is not applicable in this area.

Lower Potomac River

In the mesohaline (moderate salinity) Potomac River, downstream of Mathias point to Point Lookout has had steady increases in SAV coverage since 1992 (when there was 238 acres), and reaching the highest recorded level in 2004 of 3,062 acres (or 30% of the 10,173 acre revised goal) (www.vims.edu/bio/sav/). On the Maryland side, there are fringing beds from the Route 301 bridge to Cobb Island, scattered throughout the Wicomico River and St. Clements Bay. There are a few small beds downstream from here, but no large beds until St. George Island with fringing beds through much of the lower St. Mary's River. On the Virginia side, there is a large fringing bed from Mathias Point to the Upper Machodoc Creek. Ground-truthing by citizens and staff from Patuxent River Park, Patuxent Naval Air Station, U. S. Geological Survey, U. S. Fish and Wildlife Service and Virginia Institute of Marine Science has identified 11 species with milfoil, horned pondweed and wild celery the three most frequently reported ones. Data from the three water quality monitoring stations (located at the Route 301 bridge, near Ragged Point and Point Lookout) indicate that light attenuation, percent light at leaf, algae, phosphorous and nitrogen levels and concentrations of suspended solids pass the SAV habitat requirements (**figure 2**).

Several large-scale SAV restoration projects occurred in the lower Potomac in 2004 and 2005. Eelgrass seeds were distributed at several locations on the St. Mary's River and St. George Creek; approximately 8 acres near Sage Point, 8 acres at Kitts Point, 8 acres at Cherryfield Point, 7 acres on the St. George Creek side of St. George Island, and 1 acre at Piney Point. Additionally, small test plots of adult shoots were installed at the same locations. Intensive monitoring of recruitment and survival has occurred throughout 2005; those results were not available as this summary was being prepared. Additional monitoring will occur in 2006.

SAV Distribution: Potomac River

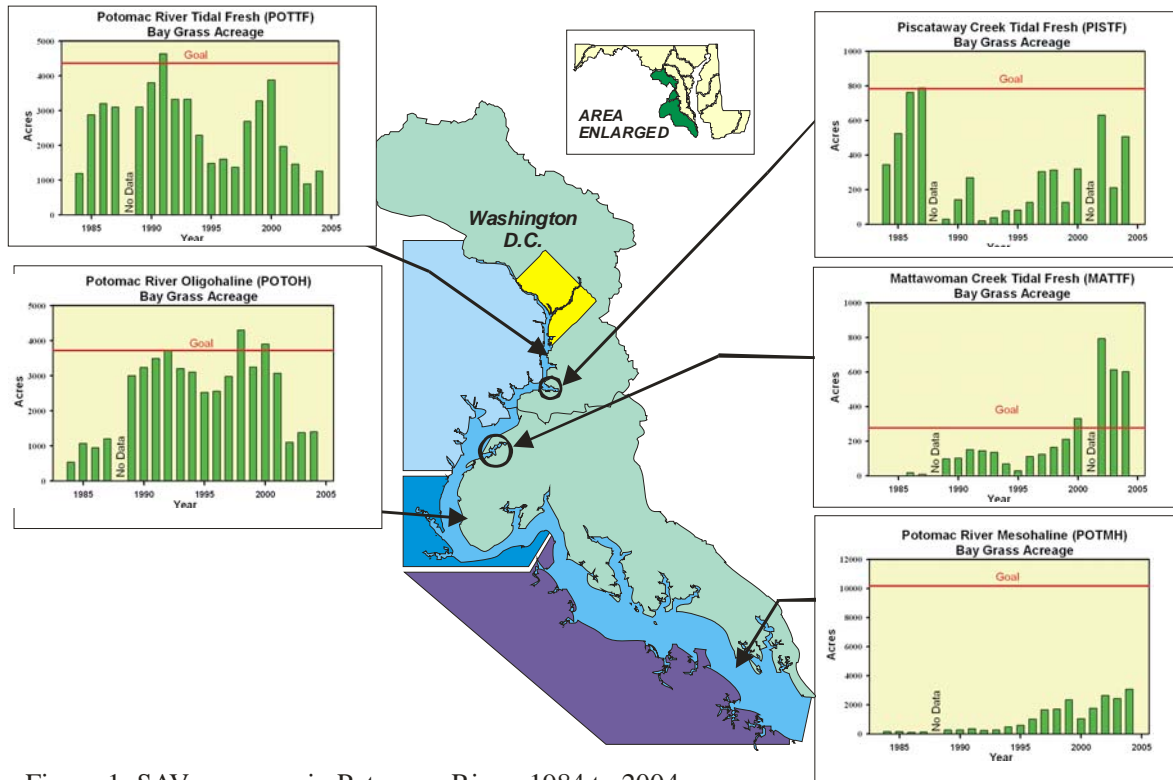


Figure 1: SAV coverage in Potomac River, 1984 to 2004

SAV Habitat Requirements: Potomac River

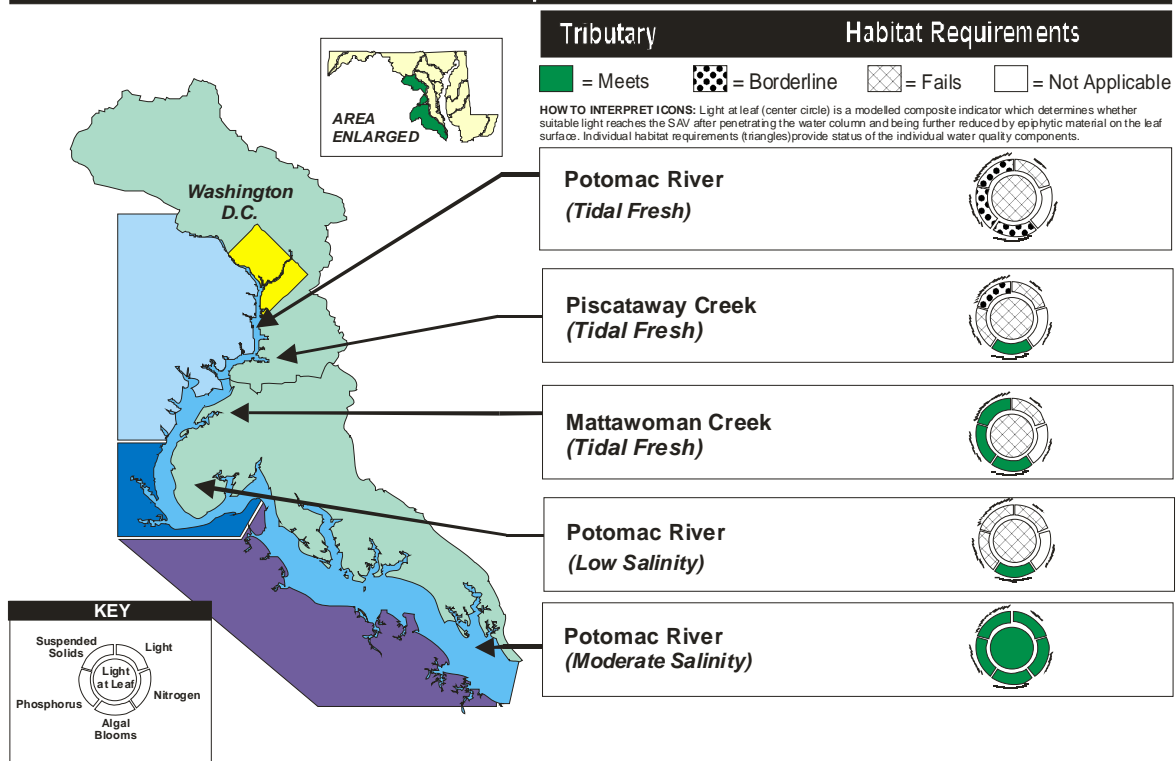


Figure 2: SAV habitat requirement attainment in Potomac River

References

Assessing water quality with submersed aquatic vegetation. W. C. Dennison, R. J. Orth, K. A. Moore, J. C. Stevenson, V. Carter, S. Kollar, P. Bergstrom and R. A. Batiuk. *Bioscience*. 1993. 43:86-94.

A perspective on plant-animal interactions in seagrasses: physical and biological determinants influencing plant and animal abundance. R. J. Orth. *In*: D. M. John, S. J. Hawkins, and J. H. Price (eds.). *Plant-Animal Interactions in the Marine Benthos*. Systematics Special Volume No. 46, Clarendon Press, Oxford, 570 pp. 1992. p. 147-164.

Waterfowl population trends in the Chesapeake Bay area. M. C. Perry and A. S. Deller. *In*: P. Hill and S. Nelson (eds.). *Toward a Sustainable Coastal Watershed: The Chesapeake Experiment*. Proceedings of a Conference. Chesapeake Research Consortium Publication No. 149, Chesapeake Research Consortium, Inc. Edgewater, Maryland. 1995. p. 490-500.

Habitat Requirements for Submerged Aquatic Vegetation in Chesapeake Bay: Water Quality, Light Regime, and Physical-Chemical Factors. W. M. Kemp, R. Batiuk, R. Bartleson, P. Bergstrom, V. Carter, C. L. Gallegos, W. Hunley, L. Karrh, E. W. Koch, J. M. Landwehr, K. A. Moore, L. Murray, M. Naylor, N. B. Rybicki, J. C. Stevenson and D. J. Wilcox. *Estuaries*. 2004. 27:363-377.